

## Project Delivery Selection Workshop

<b>Project Name</b>	I-25 Managed Lanes from 120 <sup>th</sup> Ave to SH7
<b>Date</b>	July 9, 2013
<b>Workshop Location</b>	CDOT District 4 Headquarters – Greeley, CO
<b>Facilitator</b>	Keith Molenaar
<b>Delivery Method Selected</b>	Design-Build

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## Colorado Department of Transportation Innovative Contracting Advisory Committee

### Project Delivery Selection Approach

#### Overview

This document provides a formal approach for CDOT highway project delivery selection. The document provides generic forms for use by CDOT staff and project team members. By using these forms, a brief project delivery selection report can be generated for each individual project. The primary objectives of this document are:

- Present a structured approach to assist CDOT in making project delivery decisions;
- Assist CDOT in determining if there is a dominant or obvious choice of project delivery methods; and
- Provide documentation of the project delivery decision in the form of a Project Delivery Decision Report.

#### Background

The project delivery method is the process by which a construction project is comprehensively designed and constructed including project scope definition, organization of designers, constructors and various consultants, sequencing of design and construction operations, execution of design and construction, and closeout and start-up. Thus, the different project delivery methods are distinguished by the manner in which contracts between the agency, designers and builders are formed and the technical relationships that evolve between each party inside those contracts. Currently, there are several types of project delivery systems available for publicly funded transportation projects in the Colorado. The most common systems are Design-Bid-Build (DBB), Design-Build (DB), and Construction Manager/General Contractor (CM/GC). No single project delivery method is appropriate for every project. Each project must be examined individually to determine how it aligns with the attributes of each available delivery method.

**DBB** is the traditional project delivery method in which an agency designs, or retains a designer to furnish complete design services, and then advertises and awards a separate construction contract based on the designer's completed construction documents. In DBB, the agency "owns" the details of design during construction and as a result, is responsible for the cost of any errors or omissions encountered in construction.

**DB** is a project delivery method in which the agency procures both design and construction services in the same contract from a single, legal entity referred to as the design-builder. The method typically uses Request for Qualifications (RFQ)/Request for Proposals (RFP) procedures rather than the DBB Invitation for Bids procedures. The design-builder controls the details of design and is responsible for the cost of any errors or omissions encountered in construction.

**CM/GC** is a project delivery method in which the agency contracts separately with a designer and a construction manager. The agency can perform design or contract with an engineering

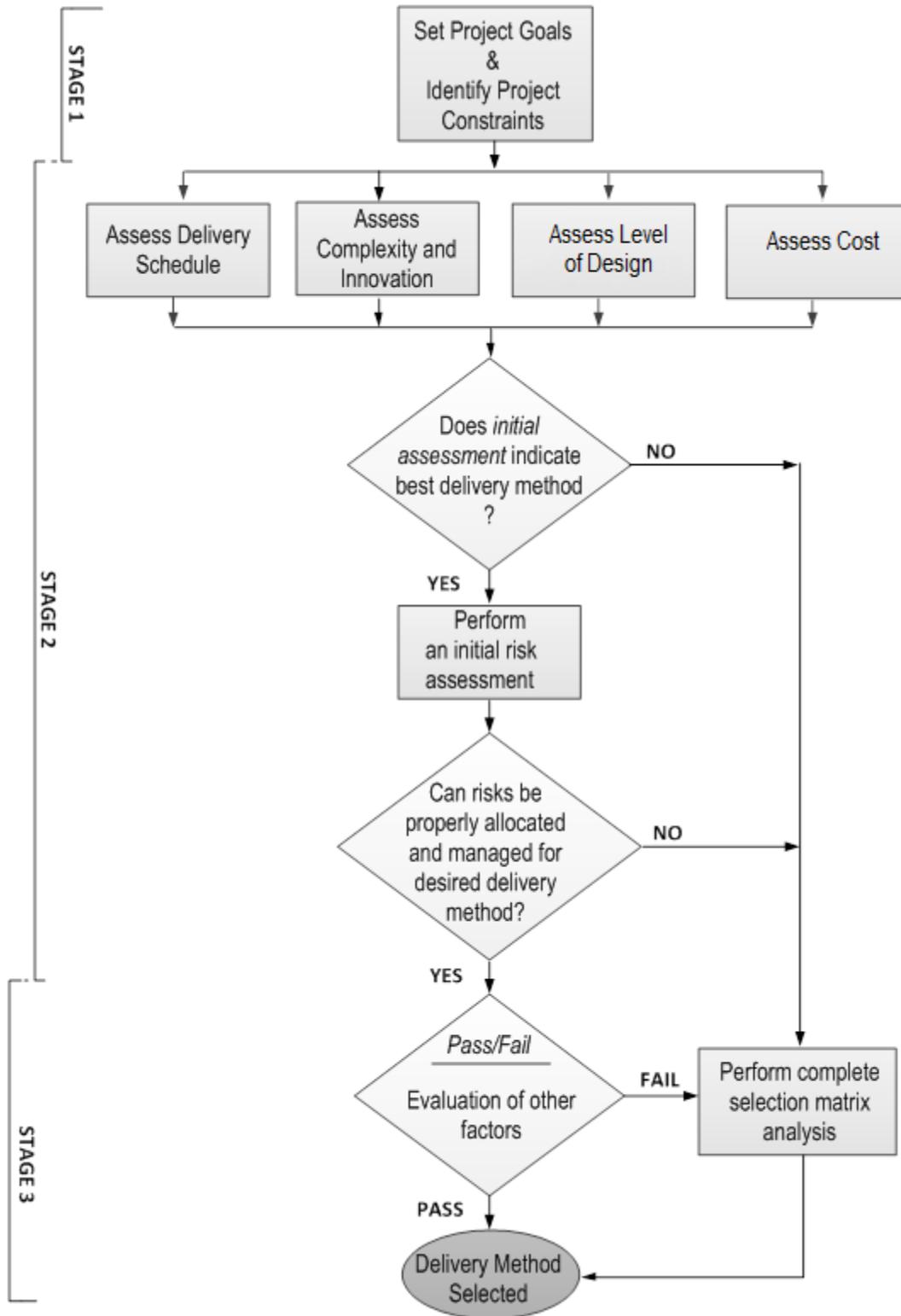
firm to provide a facility design. The agency selects a construction manager to perform construction management services and construction works. The significant characteristic of this delivery method is a contract between an agency and a construction manager who will be at risk for the final cost and time of construction. Construction industry/Contractor input into the design development and constructability of complex and innovative projects are the major reasons an agency would select the CM/GC method. Unlike DBB, CM/GC brings the builder into the design process at a stage where definitive input can have a positive impact on the project. CM/GC is particularly valuable for new non-standard types of designs where it is difficult for the owner to develop the technical requirements that would be necessary for DB procurement without industry input.

## **Overview of the Project Delivery Selection Process**

The process is shown in the form of a flow chart below. It consists of the following activities:

- A. Describe the project and set the project goals
- B. Determine and review project dependent constraints
- C. Assess the primary factors (these factors most often determine the selection).
  - 1. Delivery Schedule
  - 2. Complexity & Innovation
  - 3. Level of Design (at the time of the project delivery procurement)
  - 4. Cost
- D. If the primary factors indicate there is a clear choice of the delivery method, then:
  - 5. Perform an initial risk assessment for the desired delivery method to ensure that risks can be properly allocated and managed, and
- E. Perform a brief pass/fail analysis of the secondary factors to ensure that they are not relevant to the decision.
  - 6. Staff Experience/Availability (Owner)
  - 7. Level of Oversight and Control
  - 8. Competition and Contractor Experience
- F. If steps B, C & D do not result in clear determination of the method of delivery then perform a more rigorous evaluation of all eight factors against the three potential methods of delivery (DBB, DB and CM/GC).

Typically the entire selection process can be completed by the project team in a 4 hour workshop session, if team member have individually performed assessments before the workshop.



CDOT Project Delivery Selection Flowchart

The following forms and appendices are included to facilitate this process.

### **Project description checklist**

Provide information on the project that is using this tool. This includes size, type, funding, risks, complexities, etc. All information should be developed for the specific project.

### **Project Goals worksheet – including example project goals**

A careful determination of the project goals is an instrumental first step of the process that will guide both the selection of the appropriate method of delivery as well as the specific delivery procurement process and implementation of the project.

### **Project Constraints worksheet (Go / No-Go Decisions)**

Carefully review all possible constraints to the project. These constraints can potentially eliminate a project delivery method before the evaluation process begins.

### **Project Delivery Selection Matrix Summary**

The Project Delivery Selection Matrix Summary summarizes the assessment of the eight Evaluation Factors for the three delivery methods. The form is qualitatively scored using the scoring provided in table 1 below.

**Table 1 - Factor Evaluation Scoring Key**

<b>+ +</b>	Most appropriate delivery method
<b>+</b>	Appropriate delivery method
<b>–</b>	Least appropriate delivery method
<b>X</b>	Fatal Flaw (discontinue evaluation of this method)
<b>NA</b>	Factor not applicable or not relevant to the selection

The form also includes a section for comments and conclusions. The completed Project Delivery Selection Matrix Summary should provide an executive summary of the key reasons for the selection of the method of delivery.

### **Workshop Blank Form**

This form can be used by the project team for additional documentation of the process. In particular it can be used to elaborate on Evaluation Factor 4. “Initial Project Risk Assessment”.

### **Evaluation Factor Project Delivery Method Opportunity/Obstacle Summary**

These forms are used to summarize the assessments by the project team of the opportunities and obstacles associated with each delivery method relative to each of the eight Evaluation Factors. The bottom of each form allows for a qualitative conclusion using the same notation as described above. Those conclusions then are transferred to the **Project Delivery Selection Matrix Summary**.

### **Appendix – Opportunity/Obstacle Checklists**

These forms provide the project team with guidance concerning typical delivery method opportunities and obstacles associated with each of the eight Evaluation Factors. However, these checklist include general information and are not an all-inclusive checklist. Use the checklists as a supplement to developing project specific opportunities and obstacles.

### **Appendix – Initial Risk Assessment Guidance**

Because of the unique nature of Evaluation Factor 4. “Initial Project Risk Assessment”, the Appendix provides the project team with additional guidance for evaluation of that factor including: Typical CDOT Transportation Project Risks; a General Project Risks Checklist; and a Risk Opportunities/Obstacles Checklist.

## Project Overview:

The project from 120<sup>th</sup> to SH 7 consists of widening the existing roadway approximately 15 feet to provide for a managed lane with tolling. This will not provide for the full future build out but is an interim roadway section. The section will be 132 feet wide with a type 7 barrier separating the North and South bound traffic. The 65 feet width for each direction is less than the standard width and has FHWA's preliminary approval. The design consultant will decide the final lane configuration but the preliminary budget template was an 8 ft left shoulder 12 TEL 2 ft buffer two 11 ft. lanes a 12 ft right lane and a 9 ft. shoulder. The 2 foot buffer matches the buffer being used on the project from 84<sup>th</sup> to 120<sup>th</sup> that is under advertisement.

If RAMP funding is provided for SH 7 to SH 66 the template to be implemented is yet to be decided. This will not be resolved before January 2014. The templates being discussed with the local MPO, cities and counties is per the attached SH 7 to SH 66 interim sections. Three of the options use the existing lanes and the fourth option provides for TEL hard shoulder running with an additional 4 foot shoulder widening.

## Project Description Checklist

The following items should be considered in the project description as applicable. Other items can be added if they influence the project delivery decision. Relevant documents can be added as appendices.

- Project Name I-25 Managed Lanes 120<sup>th</sup> (SH 128) North
- Location I-25 North from SH 128 (120<sup>th</sup> Ave) to North of SH 66
- Estimated Budget \$126,000,000 From 120<sup>th</sup> to SH 66 (Total) If the section from 120<sup>th</sup> to SH 7 is RAMP funded the budget is \$54,500,000 (\$49,500,000 construction)
- Estimated Project Delivery Period CDOT 30% Design 10/2013 to 11/2014 Procurement 11-14 to 5-15 Construction 5/2015 to 6/2016
- Required Delivery Date (if applicable)
- Source(s) of Project Funding RAMP
- Project Corridor I-25
- Major Features of Work – pavement, bridge, sound barriers, etc. Bridge Widening Structure E-17-FH and E-17-FG, Roadway widening, Noise Walls, Asphalt Paving, Managed lanes implementation, and ITS. The Project follow existing grade and alignment
- Major Schedule Milestones Opening of Managed lanes from SH 128 to SH 66 Summer 2016
  - Risk Assessment (Started)
  - Design Consultant Selection (Started)
  - 30% Plans
  - Project Delivery Selection
  - Contractor RFP including shortlist and selection with GMP
  - FOR
  - Begin Construction
  - Complete construction
- Major Project Stakeholders CDOT, RTD, CDOT Transit Division, Broomfield County, and Adams County
- Major Challenges (as applicable)
  - Utilities, and Environmental Approvals ROD 2,

- During Construction Phase Traffic Management, Implantation of the managed lanes and ITS
- Maintain I-25 traffic
- ☐ Main Identified Sources of Risk ROD 2 and funding
- ☐ Safety Issues Standard traffic issues
- ☐ Sustainable Design and Construction Requirements Provide for a more uniform traffic flow thereby saving on pollution and energy. Using existing roadway template with an overlay

## Project Goals

An understanding of project goals is essential to appropriate project delivery selection. Typically, the project goals can be defined in three to five items. Examples are provided below, but the report should include project-specific goals. These goals should remain consistent over the life of the project.

### Project-Specific Goals

#### PRIMARY GOALS

Goal #1 Schedule – Very aggressive – Total completion by 2016

- Minimize project delivery time
- Complete the project on schedule
- Accelerate start of project revenue

Goal #2 Cost – 120<sup>th</sup> to SH7 – Funding through RAMP program is to be assumed for this workshop as available. This section then needs to be on or below budget

- Maximize project budget
- Complete the project on budget
- Maximize the project scope and improvements within the project budget

#### SECONDARY GOALS

Goal #3 Quality

- Meet or exceed project requirements
- Select the best team
- Provide a high quality design and construction constraints
- Provide an aesthetically pleasing project
- Project is providing interim improvements

Goal #4 Functional

- Maximize the life cycle performance of the project
- Maximize capacity and mobility improvements
- Minimize inconvenience to the traveling public during construction
- Maximize safety of workers and traveling public during construction
- Provide revenues for a future P3 project to the north

## Project Constraints

There are potential aspects of a project that can eliminate the need to evaluate one or more of the possible project delivery methods. General constraints are provided, but it is critical to identify constraints that are project specific.

### Constraints

- Source of Funding RAMP funds – Potential that these funds are not made available. State makes decision on this at end of August (assuming in this workshop that RAMP funds will be available). Unsure if RAMP funds will be available for the SH7 to SH66. Baseline for this workshop is 120<sup>th</sup> to SH7
- Schedule constraints Complete by end of 2016 based on corridor schedule
- Federal, state, and local laws
- Third party agreements with railroads, ROW, etc Utility clearance for the project itself (schedule), timely ROW plans by end of 2014 is a tight schedule
- Project specific constraint ROD 2 – Record of Decision is to be done by May 2014, however can be a risk if we do not have all the information we need and public involvement takes longer than thought. ROD 2 is for 120<sup>th</sup> to SH 66. ROW plans dependent on the ROD. Risk is reduced if ROD 2 is only for 120<sup>th</sup> to SH7.
- Project specific constraint MS 4 (water quality) for the width that is added (the additional pavement). Impact should be minimal.
- Project specific constraint Topography survey has not been completed and design cannot begin in earnest until this is completed
- Project specific constraint Need to leave the possibility of adding tolling open for consideration

### Project Delivery Selection Matrix Summary

Determine the factors that should be considered in the project delivery selection, discuss the opportunities and obstacles related to each factor, and document the discussion on the following pages. Then complete the summary below.

PROJECT DELIVERY METHOD OPPORTUNITY/OBSTACLE SUMMARY			
	DBB	DB	CM/GC
<b>Primary Evaluation Factors</b>			
1. Delivery Schedule	+	++	++
2. Project Complexity & Innovation	NA	NA	NA
3. Level of Design	+	++	+ / -
4. Cost	-	++	+
5. Perform Initial Risk Assessment	+	++	++
<b>Secondary Evaluation Factors</b>			
6. Staff Experience/Availability (Owner)	NA	PASS	NA
7. Level of Oversight and Control	NA	PASS	NA
8. Competition and Contractor Experience	NA	PASS	NA

<b>++</b>	Most appropriate delivery method
<b>+</b>	Appropriate delivery method
<b>-</b>	Least appropriate delivery method
<b>X</b>	Fatal Flaw (discontinue evaluation of this method)
<b>NA</b>	Factor not applicable or not relevant to the selection

**Project Delivery Selection Matrix Summary Conclusions and Comments:**

The project delivery selection matrix workshop resulted in selecting Design-Build for the I-25 Managed Lanes project, from 120<sup>th</sup> Ave to SH7.

Schedule, level of design, cost and risk assessment were evaluated for DBB, DB and CMGC. Innovation and complexity was not evaluated as this project is not very complex and does not need innovation to be completed. All three delivery methods were then seen as equal for this factor.

For the remaining primary factors, DB was the most appropriate delivery method. This method allows for overlapping design and construction, the level of design does not need to be advanced beyond the 30% complete level, and allows for a fixed cost to be known early in the design phase.

The ITS portion of this project is the most critical and most risky. For proper ITS, CDOT will have to provide complete design in the RFP.

The secondary factors were evaluated on a pass/fail analysis just for design-build. In each of the three secondary factors, DB is a pass

**Workshop Blank Form**

A large, empty rectangular box with a thin black border, occupying most of the page. It is intended for participants to write their notes or responses during the workshop.

### 1) Delivery Schedule

Delivery schedule is the overall project schedule from scoping through design, construction and opening to the public. Assess time considerations in getting the project started or funding dedicated and assess project completion importance.

<b>DESIGN-BID-BUILD</b>	
Requires time to perform sequential design and procurement, but if design time is available, it has the shortest procurement time after the design is complete.	
Opportunities	Obstacles
High experience	Everything is sequential - timeliness
More control of design and construction process	Less coordination of traffic impact
	High risk to meet timeframe allotted
	Design could be delayed due to topographic survey

<b>DESIGN-BUILD</b>	
Can get project under construction before completing design. Parallel process of design and construction can accelerate project delivery schedule; however, procurement time can be lengthy due to the time necessary to develop an adequate RFP, evaluate proposals and provide for a fair, transparent selection process.	
Opportunities	Obstacles
Overlapping of design with construction	Need detailed ROW coordination with design-builder
Coordinated MOT	
Procurement of materials occurs earlier, especially for long lead items and ITS	
Control time better	
Schedule can be a part of RFP	

<b>CM/GC</b>	
Quickly gets contractor under contract and under construction to meet funding obligations before completing design. Parallel process of development of contract requirements, design, procurements, and construction can accelerate project schedule. However, schedule can be slowed down by coordinating design-related issues between the CM and designer and by the process of reaching a reasonable Guaranteed Maximum Price (GMP).	
Opportunities	Obstacles
Coordinated MOT earlier in the development process	Reaching a GMP in a timely manner
	Not reaching a GMP makes project DBB
	Procurement of contractor has not begun

#### Delivery Schedule Summary

	DBB	DB	CM/GC
1. Delivery Schedule	+	++	++

**2) Project Complexity & Innovation**

Project complexity and innovation is the potential applicability of new designs or processes to resolve complex technical issues.

<b>DESIGN-BID-BUILD</b>	
Allows CDOT to fully resolve complex design issues and qualitatively evaluate designs before procurement of the general contractor. Innovation is provided by CDOT/Consultant expertise and through traditional owner directed processes such as VE studies and contractor bid alternatives.	
<b>Opportunities</b>	<b>Obstacles</b>

<b>DESIGN-BUILD</b>	
Incorporates design-builder input into design process through best value selection and contractor proposed Alternate Technical Concepts (ATCs) – which are a cost oriented approach to providing complex and innovative designs. Requires that desired solutions to complex projects be well defined through contract requirements.	
<b>Opportunities</b>	<b>Obstacles</b>

<b>CM/GC</b>	
Allows independent selection of designer and contractor based on qualifications and other factors to jointly address complex innovative designs through three party collaboration of CDOT, designer and Contractor. Allows for a qualitative (nonprice oriented) design but requires agreement on GMP.	
<b>Opportunities</b>	<b>Obstacles</b>

**Project Complexity & Innovation Summary**

	<b>DBB</b>	<b>DB</b>	<b>CM/GC</b>
2. Project Complexity & Innovation	NA	NA	NA

Notes and Comments:

Project complexity rated as a 3 on a scale of 1 to 5 with 5 being very complex. No major complexities or innovative processes acknowledged at this time. Therefore, this factor was not evaluated
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### 3) Level of Design

Level of design is the percentage of design completion at the time of the project delivery procurement

<b>DESIGN-BID-BUILD</b>	
100% design by CDOT, with CDOT having complete control over the design.	
<b>Opportunities</b>	<b>Obstacles</b>
	Sequential schedule and 100% complete design before procuring contractor may not work
	MOT design can be difficult

<b>DESIGN-BUILD</b>	
Design advanced by CDOT to the level necessary to precisely define contract requirements and properly allocate risk (typically 30% or less).	
<b>Opportunities</b>	<b>Obstacles</b>
Project, regardless of ITS, does not need to be advanced too far before procurement	100% of ITS design will need to be completed
Low level of design currently allows for proper RFP	

<b>CM/GC</b>	
Can utilize a lower level of design prior to procurement of the CM/GC and then joint collaboration of CDOT, designer, and CM/GC in the further development of the design. Iterative nature of design process risks extending the project schedule.	
<b>Opportunities</b>	<b>Obstacles</b>
MOT can be designed with contractor input	

#### Level of Design Summary

	<b>DBB</b>	<b>DB</b>	<b>CM/GC</b>
3. Level of Design	+	++	+ / -

#### Notes and Comments:

100% ITS design will need to be complete before procurement
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**4) Cost**

Project cost is the financial process related to meeting budget restrictions, early and precise cost estimation, and control of project costs.

<b>DESIGN-BID-BUILD</b>	
Competitive bidding provides a low cost construction for a fully defined scope of work. Costs accuracy limited until design is completed. More likelihood of cost change orders due to contractor having no design responsibility.	
<b>Opportunities</b>	<b>Obstacles</b>
Competitive bidding	ITS change orders

<b>DESIGN-BUILD</b>	
Designer-builder collaboration and ATCs can provide a cost-efficient response to project goals. Costs are determined with design-build proposal, early in design process. Allows a variable scope bid to match a fixed budget. Poor risk allocation can result in high contingencies.	
<b>Opportunities</b>	<b>Obstacles</b>
Competitive bidding	
Fixed ITS cost	
Spending of RAMP funds before 2017	
Cost certainty known earlier	

<b>CM/GC</b>	
CDOT/designer/contractor collaboration to reduce risk pricing can provide a low cost project however, non-competitive negotiated GMP introduces price risk. Good flexibility to design to a budget.	
<b>Opportunities</b>	<b>Obstacles</b>
	Risk in reaching GMP

**Cost Summary**

	<b>DBB</b>	<b>DB</b>	<b>CM/GC</b>
4. Cost	-	++	+

Notes and Comments:

**5) Initial Risk Assessment**

Risk is an uncertain event or condition that, if it occurs, has a negative effect on a project’s objectives. Risk allocation is the assignment of unknown events or conditions to the party that can best manage them. An initial assessment of project risks is important to ensure the selection of the delivery method that can properly address them. An approach that focuses on a fair allocation of risk will be most successful. Refer to risk discussion and checklists in appendix B.

<b>DESIGN-BID-BUILD</b>	
Risk allocation for design-bid-build best is understood by the industry, but requires that most design-related risks and third party risks be resolved prior to procurement to avoid costly contractor contingency pricing and change orders and claims.	
Opportunities	Obstacles
Mitigates risk of ITS due to agency providing 100% design	Risk with ITS is fully on CDOT

<b>DESIGN-BUILD</b>	
Provides opportunity to properly allocate risks to the party best able to manage them, but requires risks allocated to design-builder to be well defined to minimize contractor contingency pricing of risks.	
Opportunities	Obstacles
	Delay in design due to delay in ROD
	Risk associated with ITS and design-builder providing the correct/proper design
	ITS needs to be 100% complete in RFP

<b>CM/GC</b>	
Provides opportunity for CDOT, designer, and contractor to collectively identify and minimize project risks, and allocate risk to appropriate party. Has potential to minimize contractor contingency pricing of risk, but can lose the element of competition in pricing.	
Opportunities	Obstacles
Contractor can work with ITS to complete design	

**Initial Risk Assessment Summary**

	DBB	DB	CM/GC
5. Initial Risk Assessment	+	++	++

Notes and Comments:

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**6) Staff Experience/Availability**

Owner staff experience and availability as it relates to the project delivery methods in question.

<b>DESIGN-BID-BUILD</b>	
Technical and management resources necessary to perform the design and plan development. Resource needs can be more spread out.	
Opportunities	Obstacles

<b>DESIGN-BUILD</b>	
Technical and management resources and expertise necessary to develop the RFQ and RFP and administrate the procurement. Concurrent need for both design and construction resources to oversee the implementation.	
Opportunities	Obstacles
Can prepare RFP and evaluate proposals with consultant assistance	CDOT needs more resources to prepare RFP and review bids

<b>CM/GC</b>	
Strong, committed CDOT project management resources are important for success of the CM/GC process. Resource needs are similar to DBB except CDOT must coordinate CM's input with the project designer and be prepared for GMP negotiations.	
Opportunities	Obstacles

**Staff Experience/Availability Summary**

	DBB	DB	CM/GC
6. Staff Experience/Availability	NA	PASS	NA

Notes and Comments:

This factor was evaluated as a pass/fail for DB as first five factors determined that DB is the optimal choice

**7) Level of Oversight and Control**

Level of oversight involves the amount of agency staff required to monitor the design or construction, and amount of agency control over the delivery process

<b>DESIGN-BID-BUILD</b>	
Full control over a linear design and construction process.	
<b>Opportunities</b>	<b>Obstacles</b>

<b>DESIGN-BUILD</b>	
Less control over the design (design desires must be written into the RFP contract requirements). Generally less control over the construction process (design-builder often has QA responsibilities).	
<b>Opportunities</b>	<b>Obstacles</b>
Can provide proper oversight and control with consultant assistance	

<b>CM/GC</b>	
Most control by CDOT over both the design, and construction, and control over a collaborative owner/designer/contractor project team	
<b>Opportunities</b>	<b>Obstacles</b>

**Level of Oversight and Control Summary**

	<b>DBB</b>	<b>DB</b>	<b>CM/GC</b>
7. Level of Oversight and Control	NA	PASS	NA

Notes and Comments:

This factor was evaluated as a pass/fail for DB as first five factors determined that DB is the optimal choice

**8) Competition and Contractor Experience**

Competition and availability refers to the level of competition, experience and availability in the market place and its capacity for the project.

<b>DESIGN-BID-BUILD</b>	
High level of competition, but GC selection is based solely on low price. High level of marketplace experience.	
Opportunities	Obstacles

<b>DESIGN-BUILD</b>	
Allows for a balance of price and non-price factors in the selection process. Medium level of marketplace experience.	
Opportunities	Obstacles
Pool of bidders should be significant for this project and the location in Denver metro area	

<b>CM/GC</b>	
Allows for the selection of the single most qualified contractor, but GMP can limit price competition. Low level of marketplace experience.	
Opportunities	Obstacles

**Competition and Contractor Experience Summary**

	DBB	DB	CM/GC
8. Competition and Contractor Experience	NA	PASS	NA

Notes and Comments:

This factor was evaluated as a pass/fail for DB as first five factors determined that DB is the optimal choice

**APPENDIX**

**Opportunity and Obstacle Checklists  
(With Project Risk Assessment Discussion and Checklists)**

**1) Delivery Schedule Checklist**

DESIGN-BID-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Schedule is more predictable and more manageable</li> <li><input type="checkbox"/> Milestones can be easier to define</li> <li><input type="checkbox"/> Projects can more easily be “shelved”</li> <li><input type="checkbox"/> Shortest procurement period</li> <li><input type="checkbox"/> Elements of design can be advanced prior to permitting, construction, etc.</li> <li><input type="checkbox"/> Time to communicate/discuss design with stakeholders</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Requires time to perform a linear design-bid-construction process</li> <li><input type="checkbox"/> Design and construction schedules can be unrealistic due to lack industry input</li> <li><input type="checkbox"/> Errors in design lead to change orders and schedule delays</li> <li><input type="checkbox"/> Low bid selection may lead to potential delays and other adverse outcomes.</li> </ul>

DESIGN-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Potential to accelerate schedule through parallel design-build process</li> <li><input type="checkbox"/> Shifting schedule risk to DB team</li> <li><input type="checkbox"/> Encumbers construction funds more quickly</li> <li><input type="checkbox"/> Industry input into design and schedule</li> <li><input type="checkbox"/> Fewer chances for disputes between agency and design-builders</li> <li><input type="checkbox"/> More efficient procurement of long-lead items</li> <li><input type="checkbox"/> Ability to start construction before entire design, ROW, etc. is complete (i.e., phased design)</li> <li><input type="checkbox"/> Allows innovation in resource loading and scheduling by DB team</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Request for proposal development and procurement can be intensive</li> <li><input type="checkbox"/> Undefined events or conditions found after procurement, but during design can impact schedule and cost</li> <li><input type="checkbox"/> Time required to define technical requirements and expectations through RFP development can be intensive</li> <li><input type="checkbox"/> Time required to gain acceptance of quality program</li> <li><input type="checkbox"/> Requires agency and stakeholder commitments to an expeditious review of design</li> </ul>

CM/GC	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Ability to start construction before entire design, ROW, etc. is complete (i.e., phased design)</li> <li><input type="checkbox"/> More efficient procurement of long-lead items</li> <li><input type="checkbox"/> Early identification and resolution of design and construction issues (e.g., utility, ROW, and earthwork)</li> <li><input type="checkbox"/> Can provide a shorter procurement schedule than DB</li> <li><input type="checkbox"/> Team involvement for schedule optimization</li> <li><input type="checkbox"/> Continuous constructability review and VE</li> <li><input type="checkbox"/> Maintenance of Traffic improves with contractor inputs</li> <li><input type="checkbox"/> Contractor input for phasing, constructability and traffic control may reduce overall schedule</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Potential for not reaching GMP and substantially delaying schedule</li> <li><input type="checkbox"/> GMP negotiation can delay the schedule</li> <li><input type="checkbox"/> Designer-contractor-agency disagreements can add delays</li> <li><input type="checkbox"/> Strong agency management is required to control schedule</li> </ul>

**2) Project Complexity & Innovation Checklist**

DESIGN-BID-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> CDOT can have more control of design of complex projects</li> <li><input type="checkbox"/> CDOT&amp; consultant expertise can select innovation independently of contractor abilities</li> <li><input type="checkbox"/> Opportunities for value engineering studies during design, more time for design solutions</li> <li><input type="checkbox"/> Aids in consistency and maintainability</li> <li><input type="checkbox"/> Full control in selection of design expertise</li> <li><input type="checkbox"/> Complex design can be resolved and competitively bid</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/></li> <li><input type="checkbox"/> Innovations can add cost or time and restrain contractor's benefits</li> <li><input type="checkbox"/> No contractor input to optimize costs</li> <li><input type="checkbox"/> Limited flexibility for integrated design and construction solutions (limited to constructability)</li> <li><input type="checkbox"/> Difficult to assess construction time and cost due to innovation</li> </ul>

DESIGN-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Designer and contractor collaborate to optimize means and methods and enhance innovation</li> <li><input type="checkbox"/> Opportunity for innovation through draft RFP, best value and ATC processes</li> <li><input type="checkbox"/> Can use best-value procurement to select design-builder with best qualifications</li> <li><input type="checkbox"/> Constructability and VE inherent in process</li> <li><input type="checkbox"/> Early team integration</li> <li><input type="checkbox"/> Sole point of responsibility</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Requires desired solutions to complex designs to be well defined through technical requirements (difficult to do)</li> <li><input type="checkbox"/> Qualitative designs are difficult to define (example. aesthetics)</li> <li><input type="checkbox"/> Risk of time or cost constraints on designer inhibiting innovation</li> <li><input type="checkbox"/> Some design solutions might be too innovative or unacceptable</li> <li><input type="checkbox"/> Quality assurance for innovative processes are difficult to define in RFP</li> </ul>

CM/GC	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Highly innovative process through 3 party collaboration</li> <li><input type="checkbox"/> Allows for owner control of a designer/contractor process for developing innovative solutions</li> <li><input type="checkbox"/> Allows for an independent selection of the best qualified designer and best qualified contractor</li> <li><input type="checkbox"/> VE inherent in process and enhanced constructability</li> <li><input type="checkbox"/> Risk of innovation can be better defined and minimized and allocated</li> <li><input type="checkbox"/> Can take to market for bidding as contingency</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Process depends on designer/CM relationship</li> <li><input type="checkbox"/> No contractual relationship between designer/CM</li> <li><input type="checkbox"/> Innovations can add cost or time</li> <li><input type="checkbox"/> Scope additions can be difficult to manage</li> <li><input type="checkbox"/> Preconstruction services fees for contractor involvement</li> <li><input type="checkbox"/> Cost competitiveness – single source negotiated GMP</li> </ul>

**3) Level of Design Checklist**

DESIGN-BID-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> 100% design by owner</li> <li><input type="checkbox"/> Agency has complete control over the design (can be beneficial when there is one specific solution for a project)</li> <li><input type="checkbox"/> Project/scope can be developed through design</li> <li><input type="checkbox"/> The scope of the project is well defined through complete plans and contract documents</li> <li><input type="checkbox"/> Well-known process to the industry</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Owner design errors can result in a higher number of change orders, claims, etc.</li> <li><input type="checkbox"/> Minimizes competitive innovation opportunities</li> <li><input type="checkbox"/> Can reduce the level of constructability since the contractor is not bought into the project until after the design is complete</li> </ul>

DESIGN-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Design advanced by the owner to level necessary to precisely define the contract requirements and properly allocate risk</li> <li><input type="checkbox"/> Does not require much design to be completed before awarding project to the design-builder (between ~ 10% - 30% complete)</li> <li><input type="checkbox"/> Contractor involvement in early design, which improves constructability and innovation</li> <li><input type="checkbox"/> Plans do not have to be as detailed because the design-builder is bought into the project early in the process and will accept design responsibility</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Must have very clear definitions and requirements in the RFP because it is the basis for the contract</li> <li><input type="checkbox"/> If design is too far advanced it will limit the advantages of design-build</li> <li><input type="checkbox"/> Potential for lacking or missing scope definition if RFP not carefully developed</li> <li><input type="checkbox"/> Over utilizing performance specifications to enhance innovation can risk quality through reduced technical requirements</li> <li><input type="checkbox"/> Less agency control over the design</li> <li><input type="checkbox"/> Can create project less standardized designs across agency as a whole</li> </ul>

CM/GC	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Can utilize a lower level of design prior to selecting a contractor then collaboratively advance design with owner, designer and contractor</li> <li><input type="checkbox"/> Contractor involvement in early design improves constructability</li> <li><input type="checkbox"/> CDOT controls design</li> <li><input type="checkbox"/> Design can be used for DBB if the price is not successfully negotiated.</li> <li><input type="checkbox"/> Design can be responsive to risk minimization</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Teaming and communicating concerning design can cause disputes</li> <li><input type="checkbox"/> Three party process can slow progression of design</li> <li><input type="checkbox"/> If design is too far advanced it will limit the advantages of CMGC or could require design backtracking</li> </ul>

**4) Cost Checklist**

DESIGN-BID-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Competitive bidding provides a low cost construction to a fully defined scope of work</li> <li><input type="checkbox"/> Increase certainty about cost estimates</li> <li><input type="checkbox"/> Construction costs are contractually set before construction begins</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Cost accuracy is limited until design is completed</li> <li><input type="checkbox"/> Construction costs are not locked in until design is 100% complete.</li> <li><input type="checkbox"/> Cost reductions due to contractor innovation and constructability is difficult to obtain</li> <li><input type="checkbox"/> More potential of cost change orders due to owner design responsibility</li> </ul>

DESIGN-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Contractor input into design should moderate cost</li> <li><input type="checkbox"/> Design-builder collaboration and ATCs can provide a cost-efficient response to project goals</li> <li><input type="checkbox"/> Costs are contractually set early in design process with design-build proposal</li> <li><input type="checkbox"/> Allows a variable scope bid to match a fixed budget</li> <li><input type="checkbox"/> Potential lower average cost growth</li> <li><input type="checkbox"/> Funding can be obligated in a very short timeframe</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Risks related to design-build, lump sum cost without 100% design complete, can compromise financial success of the project.</li> </ul>

CM/GC	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Owner/designer/contractor collaboration to reduce project risk can result in lowest project costs.</li> <li><input type="checkbox"/> Early contractor involvement can result in cost savings through VE and constructability</li> <li><input type="checkbox"/> Cost will be known earlier when compared to DBB</li> <li><input type="checkbox"/> Integrated design/construction process can provide a cost efficient strategies to project goals</li> <li><input type="checkbox"/> Can provide a cost efficient response to the project goals</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Non-competitive negotiated GMP introduces price risk</li> <li><input type="checkbox"/> Difficulty in GMP negotiation introduces some risk that GMP will not be successfully executed requiring aborting the CM/GC process.</li> <li><input type="checkbox"/> Paying for contractors involvement in the design phase may increase total cost</li> </ul>

## 5) Initial Risk Assessment

Three sets of risk assessment checklists are provided to assist in an initial risk assessment relative to the selection of the delivery method:

- A. **Typical CDOT Transportation Project Risks**
- B. **General Project Risks Checklist**
- C. **Opportunities/Obstacles Checklist (relative to each delivery method)**

It is important to recognize that the initial risk assessment is to only ensure the selected delivery method can properly address the project risks. A more detailed level of risk assessment should be performed concurrently with the development of the procurement documents to ensure that project risks are properly allocated, managed, and minimized through the procurement and implementation of the project.

### ***A. TYPICAL CDOT TRANSPORTATION PROJECT RISKS***

Following is a list of project risks that are frequently encountered on CDOT transportation projects and a discussion on how the risks are resolved through the different delivery methods.

**A.1: Site Conditions and Investigations** How unknown site conditions are resolved. For additional information on site conditions, refer to 23 CFR 635.109(a) at the following link: <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=91468e48c87a547c3497a5c19d640172&rqn=div5&view=text&node=23:1.0.1.7.23&idno=23#23:1.0.1.7.23.1.1.9>

#### **DESIGN-BID-BUILD**

Site condition risks are generally best identified and mitigated during the design process prior to procurement to minimize the potential for change orders and claims when the schedule allows.

#### **DESIGN-BUILD**

Certain site condition responsibilities can be allocated to the design-builder provided they are well defined and associated third party approval processes are well defined. Caution should be used as unreasonable allocation of site condition risk will result in high contingencies during bidding. CDOT should perform site investigations in advance of procurement to define conditions and avoid duplication of effort by proposers. At a minimum CDOT should perform the following investigations:

- 1) Basic design surveys
- 2) Hazardous materials investigations to characterize the nature of soil and groundwater contamination
- 3) Geotechnical baseline report to allow design-builders to perform proposal design without extensive additional geotechnical investigations

#### **CM/GC**

CDOT, the designer, and the contractor can collectively assess site condition risks, identify the need to perform site investigations in order to reduce risks, and properly allocate risk prior to GMP.

### **A.2: Utilities**

#### **DESIGN-BID-BUILD**

Utility risks are best allocated to CDOT, and mostly addressed prior to procurement to minimize potential for claims when the schedule allows.

**DESIGN-BUILD**

Utilities responsibilities need to be clearly defined in contract requirements, and appropriately allocated to both design-builder and CDOT:

*Private utilities (major electrical, gas, communication transmission facilities):* Need to define coordination and schedule risks as they are difficult for design-builder to price. Best to have utilities agreements before procurement. Note – by state regulation private utilities have schedule liability in design-build projects, but they need to be made aware of their responsibilities.

*Public Utilities:* Design and construction risks can be allocated to the design-builder, if properly incorporated into the contract requirements.

**CM/GC**

Can utilize a lower level of design prior to contracting and joint collaboration of CDOT, designer, and contractor in the further development of the design.

**A.3: Railroads (if applicable)**

**DESIGN-BID-BUILD**

Railroad risks are best resolved prior to procurement and relocation designs included in the project requirements when the schedule allows.

**DESIGN-BUILD**

Railroad coordination and schedule risks should be well understood to be properly allocated and are often best assumed by CDOT. Railroad design risks can be allocated to the designer if well defined. Best to obtain an agreement with railroad defining responsibilities prior to procurement

**CM/GC**

Railroad impacts and processes can be resolved collaboratively by CDOT, designer, and contractor. A lengthy resolution process can delay the GMP negotiations.

**A.4: Drainage/Water Quality Best Management Practices (construction and permanent)**

Both drainage and water quality often involve third party coordination that needs to be carefully assessed with regard to risk allocation. Water quality in particular is not currently well defined, complicating the development of technical requirements for projects.

Important questions to assess:

- 1) Do criteria exist for compatibility with third party offsite system (such as an OSP (Outfall System Plan))?
- 2) Is there an existing cross-drainage undersized by CDOT Criteria?
- 3) Can water quality requirements be precisely defined? Is right-of-way adequate?

**DESIGN-BID-BUILD**

Drainage and water quality risks are best designed prior to procurement to minimize potential for claims when the schedule allows.

**DESIGN-BUILD**

Generally, CDOT is in the best position to manage the risks associated with third party approvals regarding compatibility with offsite systems, and should pursue agreements to define requirements for the design-builder.

**CM/GC**

CDOT, the designer, and the contractor can collectively assess drainage risks and coordination and approval requirements, and minimize and define requirements and allocate risks prior to GMP.

**A.5: Environmental:** Meeting environmental document commitments, (noise, 4(f) and historic, wetlands, endangered species, etc.)

**DESIGN-BID-BUILD**

Risk is best mitigated through design prior to procurement when the schedule allows.

**DESIGN-BUILD**

Certain environmental approvals and processes that can be fully defined can be allocated to the design-builder. Agreements or MOUs with approval agencies prior to procurement is best to minimize risks.

**CM/GC**

Environmental risks and responsibilities can be collectively identified, minimized, and allocated by CDOT, the designer, and the contractor prior to GMP

**A.6: Third Party Involvement:** Timeliness and impact of third party involvement (funding partners, adjacent municipalities, adjacent property owners, project stakeholders, FHWA, PUC)

**DESIGN-BID-BUILD**

Third party risk is best mitigated through design process prior to procurement to minimize potential for change orders and claims when the schedule allows.

**DESIGN-BUILD**

Third party approvals and processes that can be fully defined can be allocated to the design-builder. Agreements or MOUs with approval agencies prior to procurement is best to minimize risks.

**CM/GC**

Third party approvals can be resolved collaboratively by CDOT, designer, and contractor.

**B. GENERAL PROJECT RISK CHECKLIST (items to consider when assessing risk)**

Environmental Risks	External Risks
<ul style="list-style-type: none"> <li><input type="checkbox"/> Delay in review of environmental documentation</li> <li><input type="checkbox"/> Challenge in appropriate environmental documentation</li> <li><input type="checkbox"/> Defined and non-defined hazardous waste</li> <li><input type="checkbox"/> Environmental regulation changes</li> <li><input type="checkbox"/> Environmental impact statement (EIS) required</li> <li><input type="checkbox"/> NEPA/ 404 Merger Process required</li> <li><input type="checkbox"/> Environmental analysis on new alignments required</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Stakeholders request late changes</li> <li><input type="checkbox"/> Influential stakeholders request additional needs to serve their own commercial purposes</li> <li><input type="checkbox"/> Local communities pose objections</li> <li><input type="checkbox"/> Community relations</li> <li><input type="checkbox"/> Conformance with regulations/guidelines/ design criteria</li> <li><input type="checkbox"/> Intergovernmental agreements and jurisdiction</li> </ul>
Third-Party Risks	Geotechnical and Hazmat Risks
<ul style="list-style-type: none"> <li><input type="checkbox"/> Unforeseen delays due to utility owner and third-party</li> <li><input type="checkbox"/> Encounter unexpected utilities during construction</li> <li><input type="checkbox"/> Cost sharing with utilities not as planned</li> <li><input type="checkbox"/> Utility integration with project not as planned</li> <li><input type="checkbox"/> Third-party delays during construction</li> <li><input type="checkbox"/> Coordination with other projects</li> <li><input type="checkbox"/> Coordination with other government agencies</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Unexpected geotechnical issues</li> <li><input type="checkbox"/> Surveys late and/or in error</li> <li><input type="checkbox"/> Hazardous waste site analysis incomplete or in error</li> <li><input type="checkbox"/> Inadequate geotechnical investigations</li> <li><input type="checkbox"/> Adverse groundwater conditions</li> <li><input type="checkbox"/> Other general geotechnical risks</li> </ul>
Right-of-Way/ Real Estate Risks	Design Risks
<ul style="list-style-type: none"> <li><input type="checkbox"/> Railroad involvement</li> <li><input type="checkbox"/> Objections to ROW appraisal take more time and/or money</li> <li><input type="checkbox"/> Excessive relocation or demolition</li> <li><input type="checkbox"/> Acquisition ROW problems</li> <li><input type="checkbox"/> Difficult or additional condemnation</li> <li><input type="checkbox"/> Accelerating pace of development in project corridor</li> <li><input type="checkbox"/> Additional ROW purchase due to alignment change</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Design is incomplete/ Design exceptions</li> <li><input type="checkbox"/> Scope definition is poor or incomplete</li> <li><input type="checkbox"/> Project purpose and need are poorly defined</li> <li><input type="checkbox"/> Communication breakdown with project team</li> <li><input type="checkbox"/> Pressure to delivery project on an accelerated schedule</li> <li><input type="checkbox"/> Constructability of design issues</li> <li><input type="checkbox"/> Project complexity (scope, schedule, objectives, cost, and deliverables are not clearly understood)</li> </ul>
Organizational Risks	Construction Risks
<ul style="list-style-type: none"> <li><input type="checkbox"/> Inexperienced staff assigned</li> <li><input type="checkbox"/> Losing critical staff at crucial point of the project</li> <li><input type="checkbox"/> Functional units not available or overloaded</li> <li><input type="checkbox"/> No control over staff priorities</li> <li><input type="checkbox"/> Lack of coordination/ communication</li> <li><input type="checkbox"/> Local agency issues</li> <li><input type="checkbox"/> Internal red tape causes delay getting approvals, decisions</li> <li><input type="checkbox"/> Too many projects/ new priority project inserted into program</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Pressure to delivery project on an accelerated schedule.</li> <li><input type="checkbox"/> Inaccurate contract time estimates</li> <li><input type="checkbox"/> Construction QC/QA issues</li> <li><input type="checkbox"/> Unclear contract documents</li> <li><input type="checkbox"/> Problem with construction sequencing/ staging/ phasing</li> <li><input type="checkbox"/> Maintenance of Traffic/ Work Zone Traffic Control</li> </ul>

**C. RISK OPPORTUNITIES/OBSTACLES CHECKLIST (relative to each delivery method)**

DESIGN-BID-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Risks managed separately through design, bid, build is expected easier</li> <li><input type="checkbox"/> Risk allocation is most widely understood/used</li> <li><input type="checkbox"/> Opportunity to avoid or mitigate risk through complete design</li> <li><input type="checkbox"/> Risks related to environmental, railroads, and third party involvement are best resolved prior to procurement</li> <li><input type="checkbox"/> Utilities and ROW best allocated to CDOT and mostly addressed prior to procurement to minimize potential for claim</li> <li><input type="checkbox"/> Project can be shelved while resolving risks</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Owner accepts risks associated with project complexity (the inability of designer to be all-knowing about construction) and project unknowns</li> <li><input type="checkbox"/> Low-bid related risks</li> <li><input type="checkbox"/> Potential for misplaced risk through prescriptive specifications</li> <li><input type="checkbox"/> Innovative risk allocation is difficult to obtain</li> <li><input type="checkbox"/> Limited industry input in contract risk allocation</li> <li><input type="checkbox"/> Change order risks can be greater</li> <li><input type="checkbox"/> Contractor may avoid risks</li> </ul>

DESIGN-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Performance specifications can allow for alternative risk allocations to the design builder</li> <li><input type="checkbox"/> Risk-reward structure can be better defined</li> <li><input type="checkbox"/> Innovative opportunities to allocate risks to different parties (e.g., schedule, means and methods, phasing)</li> <li><input type="checkbox"/> Opportunity for industry review of risk allocation (draft RFP, ATC processes)</li> <li><input type="checkbox"/> Avoid low-bid risk in procurement</li> <li><input type="checkbox"/> Contractor will help identify risks related to environmental, railroads, ROW, and utilities</li> <li><input type="checkbox"/> Designers and contractors can work toward innovative solutions to, or avoidance of, unknowns</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Need a detailed project scope, description etc., for the RFP to get accurate/comprehensive responses to the RFP (Increased RFP costs may limit bidders)</li> <li><input type="checkbox"/> Limited time to resolve risks</li> <li><input type="checkbox"/> Additional risks allocated to designers for errors and omissions, claims for change orders</li> <li><input type="checkbox"/> Unknowns and associated risks need to be carefully allocated through a well-defined scope and contract</li> <li><input type="checkbox"/> Risks associated with agreements when design is not completed</li> <li><input type="checkbox"/> Poorly defined risks are expensive</li> <li><input type="checkbox"/> Contractor may avoid risks or drive consultant to decrease cost at risk to quality</li> </ul>

CM/GC	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Contractor can have a better understanding of the unknown conditions as design progresses</li> <li><input type="checkbox"/> Innovative opportunities to allocate risks to different parties (e.g., schedule, means and methods, phasing)</li> <li><input type="checkbox"/> Opportunities to manage costs risks through CM/GC involvement</li> <li><input type="checkbox"/> Contractor will help identify and manage risk</li> <li><input type="checkbox"/> Agency still has considerable involvement with third parties to deal with risks</li> <li><input type="checkbox"/> Avoids low-bid risk in procurement</li> <li><input type="checkbox"/> More flexibility and innovation available to deal with unknowns early in design process</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Lack of motivation to manage small quantity costs</li> <li><input type="checkbox"/> Increase costs for non-proposal items</li> <li><input type="checkbox"/> Disagreement among Designer-Contractor-Owner can put the process at risk</li> <li><input type="checkbox"/> If GMP cannot be reached, additional low-bid risks appear</li> <li><input type="checkbox"/> Limited to risk capabilities of CM/GC</li> <li><input type="checkbox"/> Designer-contractor-agency disagreements can add delays</li> <li><input type="checkbox"/> Strong agency management is required to negotiate/optimize risks</li> <li><input type="checkbox"/> Discovery of unknown conditions can drive up GMP, which can be compounded in phased construction</li> </ul>

**6) Staff Experience/Availability Checklist**

DESIGN-BID-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Agency, contractors and consultants have high level of experience with the traditional system</li> <li><input type="checkbox"/> Designers can be more interchangeable between projects</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Can require a high level of agency staffing of technical resources</li> <li><input type="checkbox"/> Staff's responsibilities are spread out over a longer design period</li> <li><input type="checkbox"/> Can require staff to have full breadth of technical expertise</li> </ul>

DESIGN-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Less agency staff required due to the sole source nature of DB</li> <li><input type="checkbox"/> Opportunity to grow agency staff by learning a new process</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Limitation of availability of staff with skills, knowledge and personality to manage DB projects</li> <li><input type="checkbox"/> Existing staff may need additional training to address their changing roles</li> <li><input type="checkbox"/> Need to "mass" agency management and technical resources at critical points in process (i.e., RFP development, design reviews, etc.)</li> </ul>

CM/GC	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Agency can improve efficiencies by having more project managers on staff rather than specialized experts</li> <li><input type="checkbox"/> Smaller number of technical staff required through use of consultant designer</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Strong committed owner project management is important to success</li> <li><input type="checkbox"/> Limitation of availability of staff with skills, knowledge and personality to manage CMGC projects</li> <li><input type="checkbox"/> Existing staff may need additional training to address their changing roles</li> <li><input type="checkbox"/> Agency must learn how to negotiate GMP projects</li> </ul>

**7) Level of Oversight and Control Checklist**

DESIGN-BID-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Full owner control over a linear design and construction process</li> <li><input type="checkbox"/> Oversight roles are well understood</li> <li><input type="checkbox"/> Contract documents are typically completed in a single package before construction begins</li> <li><input type="checkbox"/> Multiple checking points through three linear phases: design-bid-build</li> <li><input type="checkbox"/> Maximum control over design</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Requires a high-level of oversight</li> <li><input type="checkbox"/> Increased likelihood of claims due to owner design responsibility</li> <li><input type="checkbox"/> Limited control over an integrated design/construction process</li> </ul>

DESIGN-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> A single entity responsibility during project design and construction</li> <li><input type="checkbox"/> Continuous execution of design and build</li> <li><input type="checkbox"/> Getting input from construction to enhance constructability and innovation</li> <li><input type="checkbox"/> Overall project planning and scheduling is established by one entity</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Can require high level of design oversight</li> <li><input type="checkbox"/> Can require high level of quality assurance oversight</li> <li><input type="checkbox"/> Limitation on staff with DB oversight experience</li> <li><input type="checkbox"/> Less owner control over design</li> <li><input type="checkbox"/> Control over design relies on proper development of technical requirements</li> </ul>

CM/GC	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Preconstruction services are provided by the construction manager</li> <li><input type="checkbox"/> Getting input from construction to enhance constructability and innovation</li> <li><input type="checkbox"/> Provides owner control over an integrated design/construction process</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Agency must have experienced staff to oversee the CM/GC</li> <li><input type="checkbox"/> Higher level of cost oversight required</li> </ul>

8) Competition and Contractor Experience

DESIGN-BID-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Promotes high level of competition in the marketplace</li> <li><input type="checkbox"/> Opens construction to all reasonably qualified bidders</li> <li><input type="checkbox"/> Transparency and fairness</li> <li><input type="checkbox"/> Reduced chance of corruption and collusion</li> <li><input type="checkbox"/> Contractors are familiar with DBB process</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Risks associated with selecting the low bid (the best contractor is not necessary selected)</li> <li><input type="checkbox"/> No contractor input into the process</li> <li><input type="checkbox"/> Limited ability to select contractor based on qualifications</li> </ul>

DESIGN-BUILD	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Allows for a balance of qualifications and cost in design-builder procurement</li> <li><input type="checkbox"/> Two-phase process can promote strong teaming to obtain "Best Value"</li> <li><input type="checkbox"/> Increased opportunity for innovation possibilities due to the diverse project team</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Need for DB qualifications can limit competition</li> <li><input type="checkbox"/> Lack of competition with past experience with the project delivery method</li> <li><input type="checkbox"/> Reliant on DB team selected for the project</li> <li><input type="checkbox"/> The gap between owner experience and contractor experience with delivery method can create conflict</li> </ul>

CM/GC	
Opportunities	Obstacles
<ul style="list-style-type: none"> <li><input type="checkbox"/> Allows for qualifications based contractor procurement</li> <li><input type="checkbox"/> Agency has control over an independent selection of best qualified designer and contractor</li> <li><input type="checkbox"/> Contractor is part of the project team early on, creating a project "team"</li> <li><input type="checkbox"/> Increased opportunity for innovation due to the diversity of the project team</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Currently there is not a large pool of contractors with experience in CMGC, which will reduce the competition and availability</li> <li><input type="checkbox"/> Working with only one contractor to develop GMP can limit price competition</li> <li><input type="checkbox"/> Requires a strong project manager from the agency</li> <li><input type="checkbox"/> Teamwork and communication among the project team</li> </ul>